REMARKS/ARGUMENTS

The application has been amended. In particular, paragraph [0002] of the specification has been amended to reflect that Application No. 10/459899 has issued as U.S. Patent No. 6,746,180 B2. Moreover, paragraph [0043] has been amended to correct minor typographical errors. The abstract has been amended in order to comply with the proper language and format for an abstract of the disclosure. Also, claims 1-3, 29, 30, 39, 40, 41, 43 and 44 have been amended. It is noted that the amendment in step (b) of claim 1, is a non-narrowing amendment.

Information Disclosure Statement

The Examiner states that at least paragraphs 8, 9, 15-18, 38-39, 47-50, 87, 88, 90 and 91 refer to references not listed on the Information Disclosure Statement (IDS). The Examiner also states that unless the references have been cited by the Examiner on form PTO892, they will not be printed on the face of the patent.

Applicants have in fact filed an Information Disclosure Statement in compliance with the rules on June 7, 2004. A listing of these references on Form PTO 1449 was included. The references referred to by the Examiner are included in the IDS. Although these references are believed to provide background information only, Applicants would like these to be considered by the Examiner so that they will be printed on the face of the patent.

Objections to the Specification

The Examiner has objected to the abstract for failing to comply with the proper language and format for an abstract of the disclosure. The Examiner has also objected to Applicants' cross-reference to related applications for failing to indicate that related

Application No. 10/459899 has since issued as U.S. Patent No. 6, 746, 180 B2. Finally, the disclosure is objected to because of typing/grammatical errors noted in paragraph [0043].

Each of these objections have been addressed in the amendments to the specification presented herewith.

Claim Objections

The Examiner has objected to claims 2 and 3 under 37 CFR 1.75(c), as being allegedly of improper dependent form for failing to further limit the subject matter of a previous claim. She notes that the motivation to provide a specific step or condition is not considered a patentable limitation.

These objections have been addressed in the claim amendments presented herewith.

Claim Rejections Under 35 U.S.C. §112

The Examiner has rejected claims 1-53 under 35 U.S.C. §112, second paragraph. In particular, it is unclear to the Examiner whether the reaction products in step "b" are the same reaction products formed in step "c" or if these are reaction products formed in the biodegradation step, or otherwise formed reaction products, and it is not clear if or how the reaction products in steps "b" and "c" are related.

The Examiner has also rejected claims 29, 30, 39, 40, 43 and 44 for their reference to "reaction products", since it is unclear to the Examiner whether the "reaction products" are those formed during step "b" or step "c".

Each of these rejections has been addressed in the non-narrowing amendments presented herewith.

Double Patenting Rejections

The Examiner has rejected claims 1-53 under the judicially created doctrine of obviousness-type double patenting as being allegedly unpatentable over claim 1-2 and 4-53 of U.S. Patent No. 6,746,180.

With respect to the double patenting rejection, Applicants will consider the appropriateness of filing a terminal disclaimer upon the finding of allowable subject matter in the present application.

Claim Rejections Under 35 U.S.C. §103(a)

The Examiner has rejected claims 1-52 under 35 U.S.C. §103(a) as being allegedly unpatentable over U.S. Patent No. 6,046,375 to Goodell, et al. (hereinafter Goodell) in view of U.S. Patent No. 6,160,194 to Pignatello (hereinafter Pignatello).

Claim 53 is rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Goodell in view of Pignatello, and further in view of U.S. Patent No. 6,251,657 to Hunter, et al. (hereinafter Hunter).

Claim 53 is also rejected under 35 U.S.C.§ 103(a) as being allegedly unpatentable over Goodell in view of Pignatello, and further in view of U.S. Patent No. 5,840,191 to Eccles (hereinafter Eccles).

These rejections are respectfully traversed for the reasons set forth below.

The present invention provides a method for treating a contaminate contaminated with an organic compound which requires the combination of bioremediation (step b) followed by chemical oxidation (step c). The specific sequence of the steps is required by the claim language. As disclosed in the Application at page 6, paragraph [0021] and in Example 6, treating the contaminate with a biodegradation step prior to the chemical oxidation step was found by the present inventors to have a pronounced effect on the outcome of the combined treatment. In particular, biodegradation followed by chemical treatment was superior to the reverse-order sequence in the degradation of polyaromatic hydrocarbons (PAHs) in contaminated soil. This was quite unexpected, and is neither taught nor suggested by the prior art.

As recited in claim 1, the bioremediation step involves contacting the contaminate with a microbial consortium under conditions suitable for the microbial consortium to mediate solubilization or biodegradation of the organic compound or chemical oxidation products thereof. The subsequent chemical oxidation step includes contacting the bioremediated contaminate with a transition metal in soluble form; and an isolated (for example, from a natural or synthetic source) chelator of the transition metal, wherein the chelator and the transition metal form a transition metal:chelator complex. The chemical oxidation step further includes contacting the contaminate with an oxidizing agent; and a buffering salt to maintain the pH in the neutral range.

Before the present invention, it was not known whether chemical oxidation employing Fenton chemistry and bioremediation could be combined because Fenton chemistry is typically required to be carried out at an acidic pH. The present inventors have found that by employing an isolated chelator for the metal species and by employing a neutral pH which is maintained throughout the treatment method, the environmental conditions become suitable to sustain a microbial consortium which can enhance the remediation process.

As disclosed in the Application at page 12, paragraph [0051], the combination of chemical treatment and biodegradation of the present invention has the great advantage over either treatment alone in the remediation of organic contaminants, such as PAHs. In fact, before the present invention, bioremediation strategies had limited applicability when soils, sediments and subsurface sites were contaminated with such PAHs, as described in paragraph [0011] of the application.

Goodell fails to disclose, teach or suggest several aspects of the pending claims. To begin with, Goodell does not disclose or suggest the combination of a bioremediation step which employs a microbial consortium and a chemical treatment step which employs an isolated transition metal chelator. Goodell, at best, suggests that the metal chelator itself can be provided in the form of whole fungi organisms or in the form of an enriched chelator fraction from fungi. However, there is neither a teaching nor a suggestion to employ both an isolated metal chelator and a microbial consortium in Goodell's method.

There is also neither a teaching nor a suggestion in Goodell to specifically carry out bioremediation followed by chemical treatment, as recited in Applicants' claims. As described above, Applicants have found that the order of addition of biological and chemical agents has a pronounced effect on the outcome of the combined treatment, which was quite unexpected.

Finally, Goodell is devoid of any specific teaching with respect to a neutral pH range. In fact, Goodell states that his method is generally performed at acidic pH (abstract), because at neutral pH values and above, the reduction of iron is alleged to be greatly limited (column 13, lines 15-24). Thus, Goodell, as a whole, teaches away from maintaining a neutral pH range. One skilled in the art would readily recognize that such low pH conditions hamper microbial activity.

In summary, Goodell fails to teach or suggest the combination of chemical treatment employing an isolated metal chelator and microbial degradation, while maintaining the pH in a neutral range, as recited in Applicants' claims. It also fails to teach or suggest that carrying out bioremediation prior to chemical treatment with an isolated chelator can have an effect on the outcome of the remediation.

Pignatello fails to make up for the deficiencies of Goodell. For example, it does not teach, disclose or suggest a combination of a chemical treatment step employing an isolated chelator and a bioremediation step employing a microbial consortium. It also does not teach, disclose or suggest that the order of addition of biological and chemical agents can have an effect on the outcome of combined treatment. Moreover, Pignatello is devoid of any specific teaching with regard to maintaining a neutral pH during the treatment method. Pignatello suggests that a reaction between a pre-formed chelate and an oxidizing agent can proceed at the pH of soil. However, as recognized by Pignatello, the pH of soil can vary widely (from about 3.5 to about 8) and need not be neutral.

In summary, Pignatello fails to cure the deficiencies of the Goodell reference. Thus, the combination of Goodell in view of Pignatello fails to render the present claims obvious. Withdrawal of the combination of these references is respectfully requested.

The Examiner has also rejected claim 53 under 35 U.S.C. §103(a) as being allegedly unpatentable over Goodell in view of Pignatello and further in view of Hunter. Hunter has been cited for its alleged teachings of particular microorganisms and methods for degrading hydrocarbons. Hunter is devoid of any teaching or suggestion with respect to chemical oxidation using transition metals. In this respect, one of ordinary skill in the art would not be motivated to take a reference which is entirely devoted to microbial activity in an aqueous medium, and combine it with chemical oxidation, when it is known that the conditions for

doing so are distinctly different. None of the references disclose such a combination, nor the conditions which would be required for such a combination to properly and effectively work.

It is submitted, therefore, that the combination of Goodell and Pignatello in view of Hunter should be withdrawn.

The Examiner has also rejected claim 53 under 35 U.S.C. §103(a) as being allegedly unpatentable over Goodell in view of Pignatello and further in view of Eccles. Eccles has been cited for its alleged teachings of the specific use of microbial agents to degrade organic contaminants. This rejection is similar to the previous rejection using the Hunter reference. Eccles, however, is even less specific in its teachings regarding pH. Eccles discloses a pH range of 4-9 for the organic degradation stage of his process. While this range encompasses a neutral range, it does not teach a specific use of a neutral range for its microorganisms, nor does it teach such a range be used in combination with chemical oxidation. Moreover, Eccles discloses an acidic pH range in the second stage of his decontamination process which uses microbially produced sulfuric acid to break down organic contaminants, or metal species. This teaches away from maintaining a neutral pH range.

For these reasons, it is submitted that the combination of these references do not render the claims obvious. Withdrawal of the rejection is respectfully requested.

Applicants submit that the claims as submitted are patentably distinct over the art and allowable in form and allowance of claims is respectfully solicited. Should the Examiner have any questions regarding this response, she is encouraged to contact the undersigned at the telephone number given below.

Respectfully Submitted

Gloria K. Szakiel
Agent for Applicants
Registration No. 45,149

HOFFMANN & BARON, LLP
6900 Jericho Turnpike
Syosset, New York 11791
(973) 331-1700